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oviducal membranes of still lower forms,[1] and that it would tend to take up calcareous matters in the same way as similar membranes in other parts of the body of a vertebrate. (See my paper "A Physiological Theory of the Calcification of the Skeleton," *Proc. Am. Philo. Soc.*, Vol. XXVI., 1889.)—JOHN A. RYDER.

PHYSIOLOGY.

THE American Physiological Society held its annual meeting for 1889 on December 27th and 28th at the College of Physicians and Surgeons in New York. H. P. Bowditch, J. G. Curtis, H. H. Donaldson, H. N. Martin, and S. W. Mitchell were elected as the Council for 1889–1890. The following communications were presented:

1. J. G. Curtis, Methods of demonstrating to a large class: *a.* The automatism of the heart of the turtle; *b.* The contraction of the diaphragm of the dog; *c.* The beating of the heart of the calf in opened thorax.
2. W. P. Lombard, The effect of fatigue on voluntary muscle contraction.
3. R. H. Chittenden, *a.* The influence of alcohol on proteid metabolism; *b.* Some observations on the relative formation of albumose and peptone in gastric digestion.
4. S. J. Meltzer, On the self-regulation of respiration.
5. H. N. Martin, The normal respiratory movements of the frog.
6. G. T. Kemp, *a.* Exhibition of a new chronograph clock; *b.* Exhibition of photographs illustrating the coagulation of blood.

On the Origin of the Central Nervous System of Vertebrates.[1]—Gaskell reviews the work of Leydig and other workers on the homologies between the arthropod and vertebrate nervous systems, and considers the resemblances between these systems, both from an anatomical and a physiological point of view, too strong to be disregarded. As to the brain, all researches indicate the anatomical separation of the brain of the crustacean into three parts, which correspond in relative position to the fore-brain, the mid-brain with the

[1] In which chalazæ are also developed, as in the egg of the common skate of our Eastern coast.

[1] *Brain*, July, 1889.

optic thalami, and the hind-brain of vertebrates. In the spinal cord we see another parallelism, for this structure in vertebrates closely resembles the ventral chain of ganglia in crustaceans.

One difficulty stood in the way of further work on the homology between the nervous system of vertebrates and the arthropod nervous system, *i.e.*, the question of the invertebrate alimentary canal. Gaskell's theory that this canal is still existent in the vertebrate nervous system removes the difficulty. The remains of the old alimentary canal are found in the non-nervous tube which is mixed up with the nervous system proper. "This alimentary canal was of the type of the crustacean canal, a large cephalic stomach, and a straight simple intestine opening by means of an anus. The remains of the non-nervous cephalic stomach are well seen in the cephalic region of the nervous system in the shape of non-nervous epithelial structures, which are so freely found here as part of the walls of the central tube, and which by being thrown into folds form on the dorsal side the choroid plexus, on the ventral side the saccus vasculosus. Remains of the mouth and œsophagus are found as a folded down tube forming the infundibulum with the lobi infundibuli. In this way an explanation is given of non-nervous structures found in connection with the nervous tube of vertebrates." Now, if Gaskell's theory be true, we ought to find in connection with the canal of the vertebrate nervous system in the cranial region, some trace of the so-called liver of crustaceans, a large and important organ opening by a duct into the pyloric end of the cephalic stomach. In man nervous material entirely fills the cranial cavity, while in the fish the brain lies in a case, the greater part of which is filled by a jelly-like material. Gaskell does not consider this jelly a packing material, but the remains of some pre-existing organ, and this organ he thinks to be the so-called liver. In the study of Ammocœtes he finds this material to be arranged in a definite mass composed of glandular looking cells, and in a hilus formed in the mass he finds the remains of a tube passing from the commencement of the fourth ventricle to the surface. The spot where it leaves the fourth ventricle is in the region of the *ganglion interpedunculare*, which according to Ahlborn contains within itself the remains of a diverticulum from the central cavity of the nervous system. The duct opens into the central cavity at the posterior limit of the fourth ventricle,—*i.e.*, into the pyloric end of the cephalic stomach.

Gaskell discusses several structures whose functions are unknown. The interpretation of the hypophysis is so closely bound up with the question as to whether it is a paired organ or not, that he disregards it.

The epiphysis is the remains of an eye which is not vesicular, and can therefore be derived from the crustacean eye. The substantia nigra, as pointed out in a previous paper, represents the remains of the stomatogastric ganglia which are found on the œsophageal commissure. In the ganglion habenulæ the author sees the remains of a very prominent part of the supra-œsophageal ganglion. The taenia thalami, "which form a system of fibres passing from the ganglion habenulæ into the cerebral hemispheres, represent the original connection between two parts of the supra-œsophageal ganglion. Meynert's bundle represents the connection between the middle segment and some part of the sub-œsophageal ganglion, probably the ganglion interpedunculare."

Finally, this theory explains the formation of the cerebral vesicles in the embryo.—L. G.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

(Continued from page 847.)

Some physiological traits of the solid-stemmed grasses, and especially of Indian Corn (maize).—30 min.—By F. L. Stewart.

On the genus Eleocharis in America.—10 min.—By N. L. Britton.

On the tropical distribution of certain sedges.—15 min.—By N. L. Britton.

Alimentary apparatus of the Honey Bee.—13 min.—By A. J. Cook.

A suggestion concerning scientific work.—15 min.—By Wm. A. Dudley.

A newly-imported Elm insect.—15 min.—By L. O. Howard.

Notes on seedlings of Elymus virginicus.—5 min.—By W. J. Beal.

Notes on Bird's-eye Maple.—15 min.—By W. J. Beal.

On the assumption of floral characters by axial growths in Andromeda catesbæi.—5 min.—By Thomas Meehan.

On the significance of dioecism as illustrated by Pycnanthemum.—10 min.—By Thomas Meehan.

On the higher division of the Pelécypoda.—40 min.—By W. H. Dall.

On the flora of New Jersey.—20 min.—By N. L. Britton.

The House-fly: Hæmatobia cornicula Will.—10 min.—By John B. Smith.

Reserve food substances in twigs.—10 min.—By Byron D. Halsted.

Notes upon stamens of Solanaceæ.—7 min.—By Byron D. Halsted.